

REVISION OF THE *Pentobesa xylinoides* (WALKER)
SPECIES GROUP (LEPIDOPTERA: NOTODONTIDAE)

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Abstract.—The neotropical notodontid genus *Pentobesa* Schaus is defined, and *Betola* Schaus is placed as its **junior subjective synonym**. *Dasylophia seriata* (Druce) is also **transferred** to *Pentobesa*. The type species *P. xylinoides* (Walker) is figured and four new species formerly confused with it are described: *P. anapiesma*, *P. ankistron*, *P. sinistra*, and *P. smithsoni*. A key and illustrations of male and female genitalia and other diagnostic sclerites are included.

Key Words: Lepidoptera, Notodontidae, neotropics

The genus *Pentobesa* Schaus (Lepidoptera: Noctuoidea: Notodontidae) is comprised of medium-sized moths and as defined below, contains 21 species. Representatives of this genus occur from the southwestern United States (*P. seriata* (Druce), new combination) to southern Peru and Bolivia (*P. poecila* (Felder), new combination). Several species of *Pentobesa* were formerly placed in the genus *Dasylophia* Packard because of their similar coloration. Species of both genera resemble broken twigs at rest, and some live animals even have a delicate tracing of green and pink on the wings as if covered with lichen. The only larval host plant known for *Pentobesa* is *Inga vera* Willd. (Leguminosae) (Janzen pers. comm.). Several neotropical species of *Dasylophia* also feed on woody legumes such as *Erythrina*, *Gliricidia*, *Rhynchosia* and *Centrosema* (unpubl. data; Weller 1989). It is possible that a general pattern of larval association with Leguminosae exists for these species.

The genus *Pentobesa* Schaus represents part of a phylogenetic puzzle in the neotropical Notodontidae. Previous work places *Pentobesa* and related genera in the *Dasylophia* clade and associates this clade with the Nystaleini (*sensu stricto*) (Weller 1989). However, due to conflicting placement in alternative cladograms, it is not clear if the *Dasylophia* clade should be included in the Nystaleini or if it deserves separate tribal status (Weller 1989, Miller 1990). Neither *Pentobesa* nor *Dasylophia* have ever been the subject of revisionary work. To resolve the phylogenetic position of these genera, a species-level treatment is required for each genus to establish character distributions.

This paper begins the taxonomic revision of the *Dasylophia* clade that is a prerequisite for phylogenetic work. Herein, I redefine *Pentobesa* and place *Betola* as a junior subjective synonym. The type species *P. xylinoides* (Walker) (Fig. 1A, B) is part of a species complex, and four new species, *P. anapiesma*, *P. ankistron*, *P. sinistra*, and *P. smithsoni*, are described. A key, illustrations of adult habitus, male and female genitalia and other diagnostic sclerites are pro-

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vided to identify members of the *P. xylinoides* complex.

MATERIALS AND METHODS

Preparation and treatment of specimens.—Standard dissecting techniques were used. Modifications specific for notodontids are discussed in detail elsewhere (Weller 1989). Genitalia were stained with chlorazol black (Kodak or ICN dissolved in 20% ethanol), or chlorazol black followed by safranin dissolved in 95% ethanol. Most preparations were mounted in balsam, but a few British Museum specimens were mounted in euparal.

Museums and collections consulted.—This work is based primarily on material from the National Museum of Natural History (NM), but the following collections were also consulted during this study: AM, American Museum of Natural History, New York; BM, Natural History Museum (formerly British Museum, Natural History), London; CAS, California Academy of Sciences, San Francisco; CM, Carnegie Museum of Natural History, Pittsburgh; CNC, Canadian National Collection, Ottawa; CUIC, Cornell University, Ithaca; NJ, N. Jacobsen, private collection, Cornell University; DJ, D. Janzen, private collection, University of Pennsylvania; LACM, Los Angeles County Museum, California; MCZ, Museum of Comparative Zoology, Harvard University, Massachusetts; SJW, S. J. Weller, private collection, Louisiana State University; and VOB, V. O. Becker, private collection, Brazil. Only locality label data and genitalic slide numbers are reported below. Collectors' names and extra institutional labels are omitted to conserve space.

Terminology.—My terminology for genitalic structures follows Forbes (1948), Sibatani et al. (1954), Sibatani (1972), Klots (1970) and Weller (1989, 1990).

Pentobesa Schaus, 1901

Pentobesa Schaus, 1901: 269. (Type species: *Edema xylinoides* Walker, 1866: 1931, by original designation.)

Betola Schaus, 1901: 289. (Type species: *Betola aroata* Schaus, 1901: 290, by original designation.) NEW SYNONYMY. *Dasylophia* of authors [not Packard, 1864].

Diagnosis.—Male genitalia have a mid-valve sclerotized plate present and expanded (Fig. 2, Mp). This character state does not occur in any other member of the *Dasylophia* clade (Weller 1989). The costa terminates in an enlarged, rectangular shape, often with a small, membranous, distal protrusion.

Description.—Medium-sized moths (male wingspan 35–50 mm; female 38–60 mm); forewing pattern varying among species groups (Fig. 1; also Draudt 1932: plate 146 row b–e, plate 148 row f) including: 1, dead wood pattern, brick red or pale brown (*P. xylinoides* species group; Fig. 1A, B); 2, light brown ground color with contrasting darker brown on outer, posterior margin, white triangular markings or white dashes on adterminal line (*P. lignicolor* complex; Fig. 1C, D); 3, dark grey or brown ground color with diagonal, pale streak (*P. aroata*–*P. poecila* complex; Fig. 1E); 4, grey with black dot in discal cell (*P. valta* Schaus; Fig. 1F; and 5, species within *P. basitincta* complex polymorphic including: a, light brown ground color with horizontal dash across discal cell and shorter dashes to apex (Fig. 1G); b, dark grey ground color demarcated by rounded antemedial and subterminal lines, midpart lighter tan or concolorous, with or without basal dash (Fig. 1H); and c, dark grey ground color from wing base to antemedial line with unpatterned, pale tan remainder. Body ground color various shades of brown; tegulae often contrasting grey or darker brown in males, and often concolorous in females. Abdominal coloration ranging from dark brown to tan dorsally, cream or buffy-white ventrally; ventrum often with longitudinal, single or multiple, dark brown, brick red, or grey ventral stripe(s); male with two lateral groups of long, spatulate setae from eighth sternite and tergite; female often with cream-colored scent scales on seventh ster-

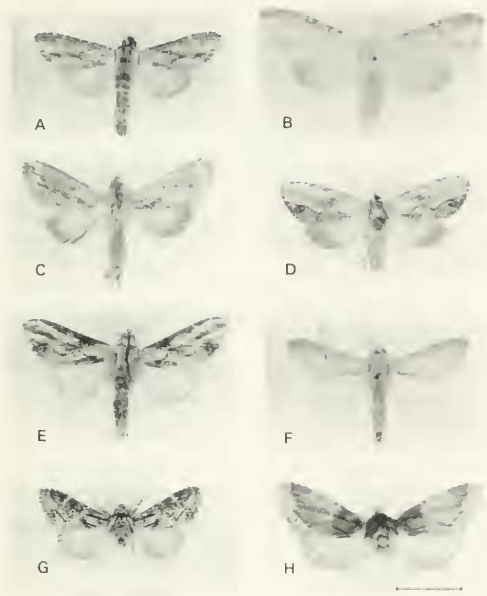


Fig. 1. Adult habitus of *P. xylinoides* species complex. A. Male *P. xylinoides*. B. female *P. xylinoides*. C. male *P. lignicolor*. D. female *P. lignicolor*. E. male *P. aroata*. F. male *P. valta*. G. male *P. basitincta*, form a. H. female *P. basitincta*, form b. Scale = 2 cm.

nite. **Head:** Antennal tufts present, male antennae pectinnate, ciliate or fasciculate, female antennae pectinnate or simple with scattered setae. Ocelli present. Proboscis well developed, pilifer setose. Third segment of labial palp either much shorter than second segment or approximately two-thirds its length. **Thorax:** Male prothoracic legs with androconia (= scent-pocket, Weller 1989, 1990) usually absent; epiphysis either long (nearly length of tibia) with short, scattered spines or epiphysis short (approximately one-third tibia) with robust comb of spines; tibial spurs often with pectinate edges. **Wings** (Fig. 3): Forewing with R3 and R4 long stalked, remaining venation variable either: 1, R2 from areole apex connate with R3/R4 stalk, R5 near areole apex, M1 from discal cell; 2, R2 connate with R3/R4 stalk, R5 stalked at or below midpoint of R3/R4 stalk, M1 from midpoint of areole; 3, same as previous except M1 from base of areole; or 4, R2 basally stalked with R3/R4, R5

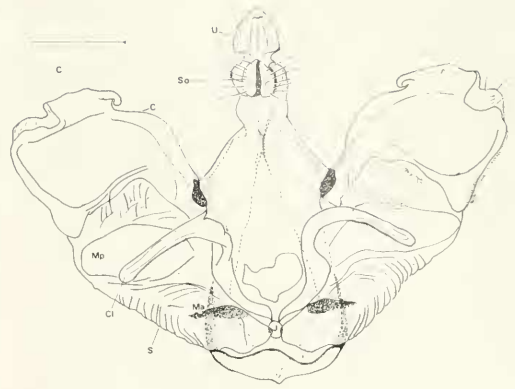


Fig. 2. Male genitalia of *P. xylinoides* (slide no. 43,144 NM). C = costa, Cl = costula, J = juxta, Ma = muscle attachment, Mp = midplate, S = sacculus, So = socius, U = uncus, C = callosum. Scale = 1 mm.

connate, M1 from areole base. Hindwing with Sc curved towards cell; Rs and M1 short or long stalked; M3 and CuA1 either connate, approximate, or stalked. **Abdomen:** Second abdominal sternite with sometimes translucent antecostal area; male lacking ctenioaphore and other abdominal androconial structures; male eighth sternite with antecostal area and caudal shape species-specific, caudal edge usually folded with

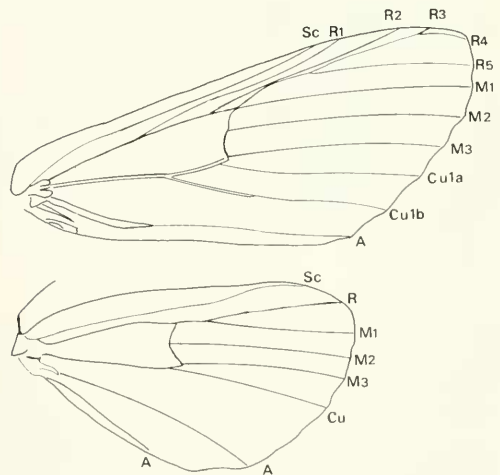


Fig. 3. Wing venation of *P. xylinoides*. C = costa, Sc = subcosta, R1-R5 = radial veins 1 to 5, a = areole, M1-M3 = medial veins 1 to 3. Cu1a, Cu1b = cubital veins, A = anal vein.

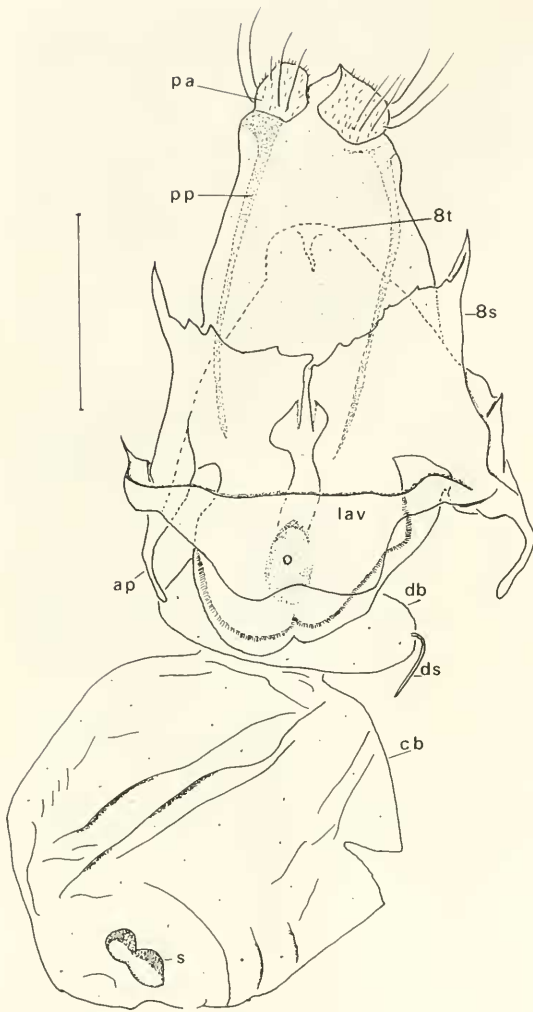


Fig. 4. Female genitalia of *P. xylinoides* (slide no. 43,330 NM). ap = anterior apophyses, cb = corpus bursae, db = ductus bursae, ds = ductus seminalis, lav = lamellae antevaginalis, o = ostium bursae, pa = papillae anales, pp = posterior apophyses, s = signa, 8t = eighth tergite, 8s = eighth sternite. Scale = 1 mm.

parallel, usually sinuate ridges extending from caudal edge towards antecosta; female seventh sternite often with invaginated posterior edge and cream-colored scent scales on margin.

Male genitalia (Fig. 2).—*Valve*: Distal portion of costa enlarged into square, triangular or rounded structure, usually with

rectangular crest, distal membranous patch with slender setae and cephalic process; midplate usually broadly expanded (narrow in *P. aroata*); saccular scent organ (Weller 1989, 1990) developed or reduced, either membranous pleated, membranous not pleated, or melanized not pleated. *Uncus*: Shape species-specific, socii slightly to greatly bent; uncus either broadly fused to tegumen or slender with apodemes fusing to tegular apodemes. *Anellar region*: Costulae present or absent; anellar ridges present with or without anellar ridge processes; juxta fused to saccular base and often to anellar ridge, juxta concave (except *P. basitincta*) and its shape species-specific. *Aedeagus*: Callosum present (Weller 1990); distiphallus often with lateral or distal processes; vesica either unornamented, with deciduous cornuti, with spines, with sclerotized patch or with some combination of above.

Female genitalia (Fig. 4).—*Papillae anales*: Membranous with long and short setae interspersed; posterior apophyses usually long with narrow base. *Eighth tergite*: Shape species-specific. *Eighth sternite*: Shape species-specific, often with lateral processes; lamellae antevaginalis usually folded and sclerotized (membranous in *P. seriata*); sinus vaginalis sometimes present; location of ostium bursae usually midventral but left-hand bias in *P. apostatica* Schaus; dorsal in *P. poecila*. *Ductus bursae*: Membranous or sclerotized, tubular or dorso-ventrally flattened, narrow or broadly expanding into corpus bursae. *Corpus bursae*: Membranous, with or without antechamber, with or without sclerotized area, with either one signum (*P. seriata*), fused pair (*P. xylinoides* complex, *P. aroata* complex, *P. valta*) or absent (*P. basitincta*, *P. poecila*); additional sclerotized projections occur in some species groups. *Ductus seminalis*: Arising from near ostial opening or from corpus bursae near ductus bursae.

Biology.—*Pentobesa xylinoides* has been reared on *Inga vera* Willd. (Janzen pers.

comm.). No immature stages or other biological data are available.

Discussion.—I regard *Betola* Schaus as a junior synonym of *Pentobesa*. The type species *B. aroata* Schaus shares the derived feature, expanded midplate on the male valve (Fig. 2, Mp), with *P. xylinoides* and lacks additional characters that would support its maintenance as a separate genus.

The North American species *Dasylophia seriata* (Druce 1887) is transferred to *Pentobesa* because males also possess the expanded midplate feature. The remaining species in *Dasylophia*, typified by the U.S. species *D. anguina* (Smith) and *D. thyatiroides* (Walker), lack the expanded midplate sclerotization, although a narrow strip of sclerotization similar to that found in *Nystalea aequipars* (Guenée) may occur. Also, *Dasylophia* species usually possess a narrower costa and lack costulae (anellar horns occur in *D. thyatiroides*) when compared to *Pentobesa* species. Finally, females of *D. seriata* possess a membranous lamellae antevaginalis that is homologous with the sclerotized one in *Pentobesa* species. The lamellae antevaginalis hinges to the eighth sternite and the ostium bursae arises from hinged area (Figs. 4, 9). This configuration appears to be unique to this genus in the *Dasylophia* clade, but the distribution of this feature requires further study.

Four, previously undescribed species have been confused under the name *P. xylinoides*. No one suspected the existence of these species due to the uniform external coloration of the adults and lack of study. The *P. xylinoides* species group is revised below.

Pentobesa xylinoides species group

Diagnosis.—The forewing ground coloration is brick red or pale brown with a white triangular patch extending from the edge of the discal cell to the adterminal line and with a contrasting darker triangular patch adjacent on its ventral border (Fig. 1A, B). The male uncus is constricted before ex-

panding distally into a hood-like structure, and its ventral surface is covered with setae. The socii are sclerotized and bent in a characteristic posture (Fig. 2).

Description.—*Coloration*: All except *P. anapiesma* (new species), sexually dimorphic. Males with red or brown antennal tufts; thorax dorsum brick red or brown; tegulae pale reddish brown, greenish-grey, grey or buff; venter of thorax and abdomen buff-colored with brick red or dark brown stripe on abdomen; male eighth tergite and sternite with brick red or dark brown spatulate scales; forewing ground color ranging from dark reddish brown to pale tan or buff. Females usually with buff or cream ground color for antennal tufts, tegulae, wings, thorax and abdomen. *Head*: Male antennae ciliate; female antennae with scattered setae. *Thorax*: Male prothoracic tibial scent pocket absent. *Abdomen*: Second sternite not translucent: male eighth sternite species-specific.

Male (Figs. 2, 8).—*Valve*: Saccular scent organ reduced, saccular base conical with muscle insertion on ridge; midplate broadly sclerotized and flat with setae on margin near costa; costa expanded dorsally with membranous terminus. *Uncus*: Internal apodemes fused to tegumen, constricted before expanding distally into hood-like structure; ventral surface covered with setae; socii sclerotized and bent in characteristic posture. *Anellar region*: Anal tube melanized; costulae either long or short, evenly tapering or constricted; juxta small, bowl-shaped. *Aedeagus*: Distiphallus ornamentation species-specific.

Female (Figs. 4, 9, 10).—*Papillae anales*: Membranous, with moderately long, curved setae, posterior apophysis usually long and thin. *Eighth tergite*: Small or large mid-dorsal prominence with longitudinal groove present; anterior apophyses variable length. *Eighth sternite*: Divided mid-ventrally by membranous groove; with two large or small lateral processes; shape of caudal margin and lamellae antevaginalis species-specific.

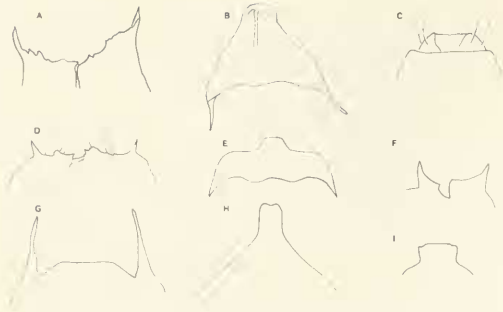


Fig. 5. Female eighth tergites and sternites of *P. xylinoides* complex. A. *P. xylinoides* sternite. B. *P. xylinoides* tergite. C. *P. anapiesma* sternite. D. *P. sinistra* sternite. E. *P. sinistra* tergite. F. *P. smithsoni* sternite. G. *P. ankistron* sternite. H. *P. ankistron* tergite. I. *P. smithsoni* tergite.

Ductus bursae: Sinus vaginalis may be present; ductus bursae sclerotized or membranous. *Ductus seminalis*: Arising from either ductus bursae near ostium or from antechamber of corpus bursae. *Corpus bursae*: membranous; antechamber usually present; one or two pairs of signae.

Discussion.—The five species in this complex can usually be separated without

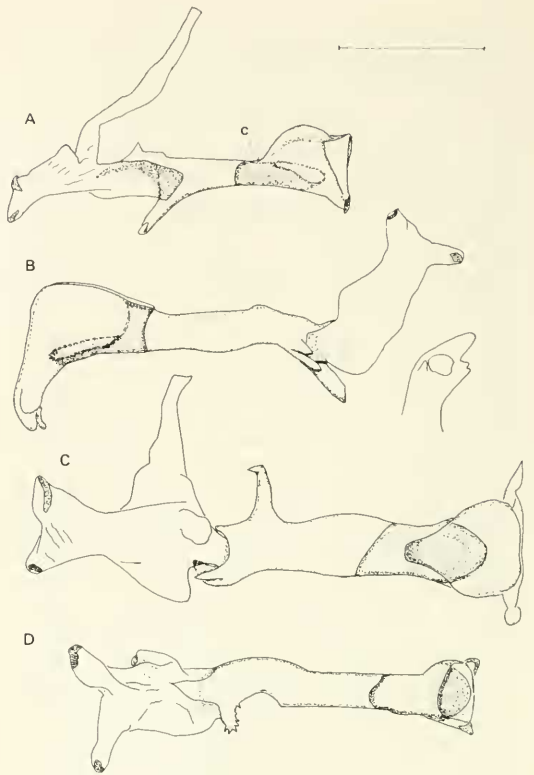


Fig. 7. Male aedeagi. A. *P. sinistra*. B. *P. xylinoides* with variation in apex shown. C. *P. ankistron*. D. *P. smithsoni*. c = callosum. Scale = 1 mm.

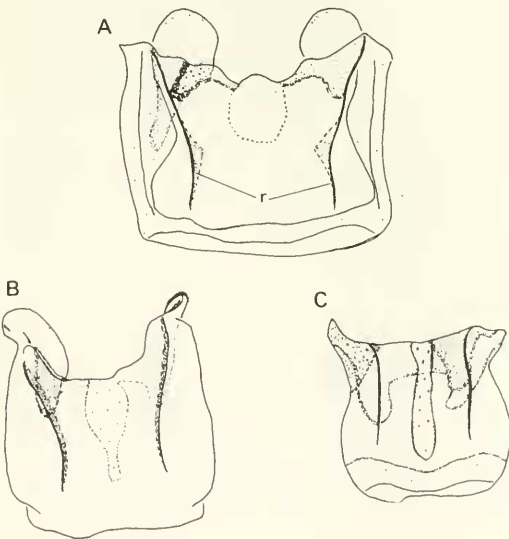


Fig. 6. Male eighth sternites of *P. xylinoides* complex. A. *P. xylinoides* or *P. ankistron*. B. *P. sinistra*. C. *P. smithsoni*. r = internal ridge.

dissection by removing scales from the posterior edge of the terminal sclerites of both males and females. Locality and wing coloration can also be used to separate some species.

KEY TO *P. XYLINOIDES* SPECIES GROUP
(Figs. 2, 4–10)

- 1. Caudal edge of female eighth sternite flat, smooth, lacking lateral projections (Fig. 5C); male unknown; species apparently monomorphic, female coloration same as male *P. xylinoides* (Fig. 1A); range: southern Brazil *P. anapiesma*
- Caudal edge of female eighth sternite either smooth or serrate, with lateral projections; male eighth sternite with slightly asymmetrical, deeply invaginated edge or with crenulate edge; sexually dimorphic, males with darker, narrower forewings (Fig. 1A), females paler with broader forewings (Fig. 1B) 2

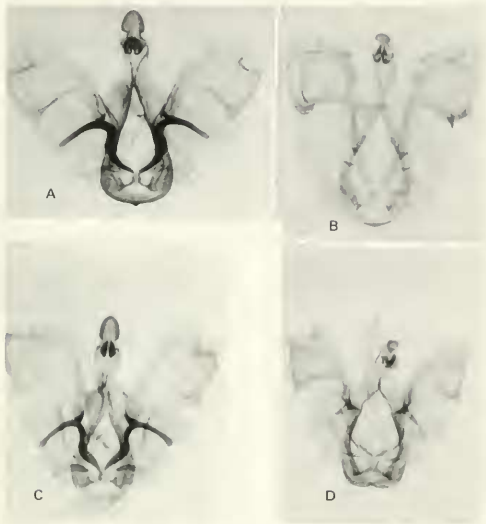


Fig. 8. Male valves. A. *P. xylinoides*. B. *P. sinistra*. C. *P. ankistran*. D. *P. smithsoni*.

2. Male eighth sternite with slightly asymmetrical, deeply invaginated edge (Fig. 6B); caudal edge of female eighth sternite with two, short, lateral projections and other small serrations (Fig. 5D), female eighth tergite with truncate protrusion (Fig. 5E); forewing coloration of male and female dark red; range: Mexico to Panama, Caribbean, French Guiana *P. sinistra*
- Male eighth sternite symmetrical or if asymmetrical, then not deeply invaginated; caudal edge of female eighth sternite smooth or if crenulate, then with large lateral projections; female tergal projection square, bulbous or tapered; coloration of both sexes lighter than *P. sinistra* 3
3. Males and females with pure white hindwing; male eighth sternite edge straight, except for left-hand projection (Fig. 6C); caudal edge of female eighth sternite smooth with short asymmetrical projections (Fig. 5F); female tergite with square process (Fig. 5I); range: Dominican Republic *P. smithsoni*
- Males and females with light tan or ivory hindwing, often with brown scales marking veins; male eighth sternite with crenulate edge (Fig. 6A); female eighth sternite smooth or crenulate with long lateral processes; female eighth tergite square or bulbous 4
4. Forewing coloration pale compared to *P. sinistra*; female eighth sternite with long lateral projections arising from asymmetrical caudal edge (Fig. 5A); female eighth tergite with bulbous protrusion (Fig. 5B); male aedeagus

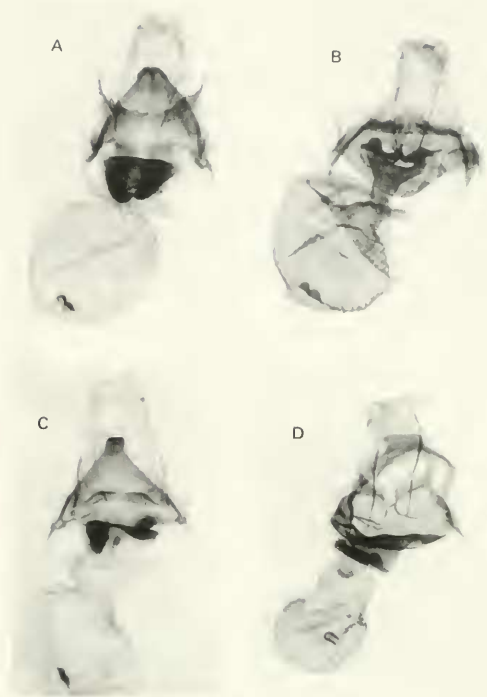


Fig. 9. Female genitalia. A. *P. xylinoides*. B. *P. sinistra*. C. *P. ankistran*. D. *P. smithsoni*.

- toothed on distiphallus apex (Fig. 7B); range: Mexico to Panama, Ecuador, northern Venezuela *P. xylinoides*
- Pale or dark morphs; female sternite with long lateral projections, caudal edge smooth not serrate (Fig. 5G); female eighth tergite with narrowly tapered projection (Fig. 5H); male distiphallus with right-hand projection (Fig. 7C); range: Amazonian basin *P. ankistran*

Pentobesa xylinoides Walker

Edema xylinoides Walker, 1866: 1931.
Symmerista pinna Druce, 1887: 239. Placed in synonymy by Schaus (1901).
Pentobesa xylinoides: Schaus, 1901: 269.
 Draudt, 1932: 913. Forbes, 1939: 251.

Diagnosis.—The male eighth sternite has a crenulate edge, and the costulae are long and evenly tapered to a rounded tip. The female eighth tergite has a large, bulbous protrusion. The female eighth sternite is divided mid-ventrally, and two large, lateral processes emanate from the serrate, asymmetrical margin.

Description.—*Coloration*: Forewings pale. Female eighth sternite cleft with oblique rise to lateral edges (Fig. 5A). *Wings*: Average male wingspan 42 mm, range 37–48 mm (N = 30); average female wingspan 54 mm, range 47–60 mm (N = 15).

Male (Figs. 2, 7B, 8A).—*Valve*: As in species-group description. *Uncus*: Hood edges crenulate; ventral surface covered with setae, slightly concave with mid-ventral, vertical ridge; socii broader, symmetrical. *Anellar region*: Costulae long, evenly wide, extending as thick anellar ridges above juxta with setae from outer edge, near midplate. *Aedeagus*: Distiphallus pointed with small lateral tooth near base of vesica but lacking large process (Fig. 7B).

Female (Figs. 4, 9A).—*Papillae anales*: Posterior apophysis long and thin (approximately 35 mm). *Eighth tergite*: Large, mid-dorsal prominence with longitudinal groove; anterior apophyses short. *Eighth sternite*: Two, large lateral processes present; divided mid-ventrally by membranous groove; caudal margin asymmetrically serrate; lamellae antevaginalis folded, W-shaped, heavily sclerotized. *Ductus bursae*: Sinus vaginalis sclerotized, antechamber membranous with ductus seminalis arising from left side. *Corpus bursae*: Membranous; signae cephalad as paired rounded spinose projections.

Discussion.—I have confirmed the Schaus (1901) synonymy of *P. pinna* with *P. xylinoides*. Mr. D. Goodger (BM) kindly dissected the Walker male type and Druce female type and compared them to drawings I provided. Both Walker and Druce based their descriptions on single specimens.

The range of *P. xylinoides* overlaps with all other species in the complex. Females of *P. xylinoides* can be separated from females of all other species without dissection. Examination of the denuded seventh sternite reveals the ovipositer and surrounding eighth sternite and tergite whose shapes are species-specific (Fig. 5A, B).

Males of *P. xylinoides* only occasionally require dissection to be identified. They can

be separated from *P. sinistra* and *P. smithsoni* by examining denuded eighth sternites (compare Fig. 6A, B & C). In South America, the hind wings of *P. xylinoides* tend to be darker than those of *P. ankistrum*. But dissections are needed in most cases to separate these two species. The aedeagus of *P. ankistrum* has a large right-hand process (Fig. 7C), whereas *P. xylinoides* lacks one (Fig. 7B).

Geographic range.—Mexico—Panama, Venezuela, Ecuador.

Altitudinal range.—50 m–1350 m.

Holotype.—Male. *Edema xylinoides* Walker. Santa Martha [Colombia]. Natural History Museum, London.

Other types.—Female. *Symmerista pinna* Druce. Panama, Volcan de Chiriqui. Natural History Museum, London.

Specimens examined (genitalic preparations: 12 males, 6 females).—**MEXICO**: Orizaba, 12°07' (1 m, slide 43,322 NM); Misantla Veracruz, VI 1911 (1 m, AM); Misantla, 1914 (1 f, slide 1527 BM); Jalapa (1 m, NM); San Luis Potosi, Tamazunchale, V-22-1977 (1 f, AM). **GUATEMALA**: Dept. Suchitepequez, Cuyotenango, 10–20 June 1966 (2 m, NM; 1 f, slide 44,209 NM); Cayuga, IV (2 m, NM), V (1 m, slide 44,210 NM), June (2 m, 1 f, NM), Jan. (1 m, CM). **HONDURAS**: Lancetilla, Tela, 28-IV-35 (1 f, slide SJW541 MCZ), V-1-35 (1 m, slide SJW539 MCZ); Cortes, Lagovojoa, 18 km NE el Mochito, 20/21 Aug. 74 (1 m, LACM); Chambolin 1789 (1 m, NM). **COSTA RICA**: Golfito, 27 March 1957 (1 m, LACM); Sixola Riv. March (1 m, CM); Sitio (1 f, NM); Guapiles, May (1 m, NM), Nov. (1 m, 1 f, NM); Tuis, July (1 m, NM); Juan Vinas, Jan. (1 f, CM), May (1 f, slide 43,330 NM); San Jose, Estacion Carillo Pk, Nac. Braulio Carrillo, 700 m Jan. 1985 (1 m, DJ), April 1985 (1 m, DJ), June 1985 (1 m, DJ), July 1984 (3 m, 1 f, DJ), Aug. 1984 (1 m, DJ), Sept. 1984 (1 m, 1 f, DJ), Oct. 1984 (2 m, DJ), Dec. 1984 (1 m, 1 f, DJ); Guanacaste Prov. 4 km E Casetilla, Rincon Nat. Pk. 18 Oct. 1982 (2 m, DJ); Heredia Prov. Finca

de la Selva (OTS) Puerto Viejo de Sarapiquí, 50 m, 14–15 Nov. 1982 (2 m, DJ); Cartago Prov. Moravia de Chirripo, 1000 m, 10 May 1983 (4 m, DJ); Alajuela Prov. El Angel waterfall, 1350 m, 8.2 km downhill Vera Blanca, 22 April 1984 (1 f, DJ); Banana River, March 1906 (1 f, NM); Sirena Corcovado Nat. Pk. Osa Penin, 23 March 1984 (1 m, DJ). **PANAMA:** Barro Colorado Island, C.Z. 23-X-1941 (1 m, NM), 16-10-1941 (1 m, NM), 10 Oct. (1 m, NM), 9-26-1941 (1 m, NM), 3-VII-1941 (1 m, slide 44,213 NM). **VENEZUELA:** Las Quigas, July (1 m, slide SJW726 CM), Nov.–March (1 f, slide SJW727 CM), May (1 m, CM), June (2 m, CM), Aug. (3 m, CM), July (1 m, CM), Nov.–March 10 (CM: 5 m, 1 f, slide SJW823; 5 m, slides SJW816, SJW817, SJW820, SJW821, & SJW822); San Esteban Valley (1 m, CM); Aroa (1 f, 1 m, NM); Valera (1 m, NM). **ECUADOR:** Carchi, Chical, 1250 m, 0°56'N, 78°11'W, 17 July 1983 (1 m, slide SJW645 CM), 30 July 1983 (1 m, CM); Pichincha, Tinalandia, 12 km SE Sto. Domingo, 79°04'W, 0°17'S (1 m, slide SJW831 SJW).

Pentobesa sinistra NEW SPECIES

Diagnosis.—The male eighth sternite is deeply U-shaped (Fig. 6B). The caudal edge of the female eighth sternite is asymmetrically serrate (Fig. 5D) and possesses two lateral processes that are only slightly longer than the serrations. The female eighth tergite has a small mid-dorsal prominence (Fig. 5E). In general, both males and females are darker than previous species, but pale specimens occur.

Description.—*Coloration:* Males dark reddish brown, females paler than males but darker than *P. xylinoides* females. *Wings:* Average male wingspan 41 mm, range 38–46 mm (N = 54); average female wingspan 49 mm, range 44–55 mm (N = 23).

Male (Figs. 7A, 8B).—*Valve:* Saccular base more square than *P. xylinoides*, midplate flat, expanded with setal patch broader, setae less robust than in *P. xylinoides*; costa

broader distally. *Anellar region:* Costulae very reduced; anellar ridge less robust, ridge setal patch reduced compared to *P. xylinoides*; juxta rectangular, fused to saccular base. *Aedeagus:* Distiphallus with left-hand, curved process and right-hand, lateral tooth (Fig. 7A).

Female (Figs. 5D, 5E, 9B).—*Seventh sternite:* Cleft with oblique rise to lateral edges. *Eighth tergite:* With small, mid-dorsal prominence that is grooved dorsally; cephalic edge strongly M-shaped; anterior apophyses longer than in *P. xylinoides*. *Eighth sternite:* Mid-ventral area membranous; caudal edge serrate, asymmetrical; lamellae antevaginalis not folded, instead flat with ostium bursae exposed. *Ductus bursae:* Membranous with narrow melanized strip ventrally; ductus seminalis from intersection of corpus bursae and ductus bursae. *Corpus bursae:* Rounded with two types of signae: cephalically, a pair spinose and rounded like *P. xylinoides*, caudally a single, tooth-like process near opening of ductus bursae.

Discussion.—The range of *P. sinistra* overlaps extensively with *P. xylinoides*. It co-occurs to a lesser degree with *P. ankistrion* in South America and *P. smithsoni* in the Dominican Republic. Specimens of *P. sinistra* can be correctly identified by examining the descaled terminal sternites of either sex.

Etymology.—The name “sinistra” is a Latin adjective and refers to the left-hand process emanating from the male distiphallus.

Geographic range.—Mexico–Panama, Caribbean, Venezuela, French Guiana, Brazil.

Altitudinal range.—380–700 m.

Holotype.—Male. Tuis, Costa Rica; July; Schaus and Barnes, coll. National Museum of Natural History.

Paratypes.—95 (genitalic preparations: 12 males, 8 females).—**MEXICO:** Yaxoquintela, Chiapas, 16°58'N, 91°47'W, 560 m, 24 Aug. 1978 (1 m, CM); Puerto Elegio Muni-

cipio, Comaltepec, Oaxaca, 2296 ft [753 m] IX-28-1961 (1 m, AM); Vera Cruz, Cordoba, 23-30 Aug. 1965 (1 m, NM). **GUA-TEMALA:** Dept. Suchitepequez, Pte. Ixtacapa, 18-19 June 1966 (1 m, NM); Iabel nr Matias de Galvez, 26-27 June 1966 (1 m, NM); Cayuga, March (1 m, NM), May (NM: 1 m, 3 f, slide 44,211), Dec. (1 m, NM); Quirigua, May (1 f, CM). **EL SALVADOR:** Santa Tecla, 900 m, 26-27 Feb. 68 (1 m, NM). **HONDURAS:** Cortes lago Yojoa, 18 km NE El Mochito, 20-21 Aug. 74 (1 m, LACM); Lancetilla, Tela, 27 Feb. 1935 (1 m, slide SJW540 MCZ); Rio Grande, July 1935 (1 m, slide 1531 BM). **COSTA RICA:** San Jose, Estacion Carrillo Pk, Nac Braulio Carrillo, 700 m, July 1984 (4 m, DJ; 1 m, slide 43,331 NM), Aug. 1984 (3 m, DJ), Sept. 1984 (3 m, DJ); Guapiles, Dec. (1 m, CM), July, 850 ft [280 m] (1 m, NM); Tuis, July (2 m, NM); Juan Vinas, June (1 m, CM), May (1 f, slide 44,212 NM); Puntarenas, Osa Peninsula, 1.8 mi W of Rincon, 27 Feb. 1971 (2 m, LACM). **PANAMA:** Barro Colorado Island, CZ 5 Feb. 1935 (1 f, slide SJW542 MCZ), 18-28 April 64 (2 m, NM); 10-17 May 64 (1 m, NM), 8-12 June 1967 (2 m, LACM), 2 July 1941 (1 m, NM), 3 July 1941 (1 m, NM), 11 July 1941 (1 m, 1 f NM), 23 July 1941 (1 f, NM); Rio Trinidad, June (1 f, NM). **ST. LUCIA:** 1 mi NW Soufriere, 18-28 Nov. 1975 (2 m, slide 44,214 NM); 1.5 mi S Mt. Gimie, 19-24 Nov. 1975 (1 m, 1 f). **DOMINICA:** S. Chiltern, 6 Feb. 1964 (1 m, NM), 14 May 1964 (1 m, NM), Clarke Hall, 3 May 1964 (2 m, NM), 8 Oct. 1966 (1 m, NM), 26-30 Nov. 1964 (1 m, NM), 18 Feb. 1965 (1 m, NM); 21 Jan. 1965 (1 m, NM), 22 Jan. 1965 (2 m, NM); 5 Feb. 1965 (1 m, NM), 9 Feb. 1965 (1 m, 1 f, NM); Grand Bay 13 March 1964 (1 m, NM); Chiltern East 3 March 1965 (2 m, NM), Pont Casse, 3 April 1965 (1 m, NM); Pont Casse 2 mi NW, 5 May 1965 (1 m, NM), 23 May 1965 (1 m, NM); 18 April 1965 (1 m, NM), 20 April 1965 (1 m, NM), 21 April 1965 (1 m, 1 f, NM); Syndicate Est. 5 March 1964 (1 m, NM);

La Vega Prov. Hotel Montana ca 520 m, 10 km NE Jarabacoa, 28 May 1973 (1 m, NM). **British West Indies:** Antrim 1000 ft [328 m], 12 March 1956 (3 m, 1 f, NM), 13 March 1956 (2 m, NM), 13 March 1956 (1 m, NM). **FRENCH GUIANA:** Pied Saut, Oyapok River, March 1918 (2 m, slide SJW409 CM), Feb. 1918 (4 m, CM); St-Laurent du Maroni, 4 April (1 m, NM). **BRAZIL:** Huyutanahan, Rio Purus, March 1922 (1 f, slide SJW732 CM); Prob. Sao Paulo (1 m, CM); St. Catherines (NM: 4 m, slide 44,355); Hansa Humboldt, St. Catherines (2 m, NM).

Pentobesa ankistron NEW SPECIES

Diagnosis.—The male aedeagus possesses a large curved, right-hand process and bifurcate distal process on the distiphallus (Fig. 7C). The female eighth sternite has two very long, narrow lateral processes and its caudal edge is smooth (Fig. 5G). The female eighth tergal process is narrow, curved, and ending distally in an indented ridge (Fig. 5H).

Description.—*Coloration:* Males dark reddish brown, females as in Fig. 1B, but over-all coloration darker than females of *P. xylinoides*. *Wings:* Average male wing-span 46 mm, range 40-50 mm (N = 16), female 56 mm, range 54-60 mm (N = 9).

Male (Figs. 7C, 8C).—*Eighth sternite:* Caudal edge sinuate. *Valve:* Similar to *P. xylinoides* except larger; caudal process of costa more narrow and pointed than in *P. xylinoides*. *Uncus:* Similar to *P. xylinoides* except ventral surface completely and deeply concave; and socii more narrow and slightly asymmetrical. *Anellar region:* Costulae constricted distally, with rounded, discrete ends compared to *P. xylinoides* whose costulae gently taper distally. *Aedeagus:* Distiphallus with curved right-hand process, and bifurcate distal extension on left.

Female (Figs. 5G, 5H, 9C).—*Seventh sternite:* Cleft with oblique rise to lateral edges. *Eighth tergite:* Midventral process large, curved and narrow, ending distally in toothed ridge; anterior apophyses short and strongly curved; cephalic edge weakly

M-shaped. *Eighth sternite*: In addition to Diagnosis, lamellae antevaginalis folded with ostial edge nearly straight, cephalic edge W-shaped. *Ductus bursae*: Very short, broad, lightly sclerotized. *Corpus bursae*: Membranous with antechamber; ductus seminalis arising from antechamber; one pair of spinose signae present.

Etymology.—The name “ankistron” is a Greek noun in opposition and means “hook.” The name refers to the curved process on the male distiphallus.

Geographic range.—Venezuela, French Guiana, eastern Ecuador, eastern Peru, Brazil.

Altitudinal range.—290 m–3000 m.

Holotype.—Male. St. Laurent du Maroni, Guyana Francaise. Dognin Collection. Genitalia slide no. 44,339. National Museum of Natural History.

Paratypes.—52 (genitalic preparations: 19 males, 3 females).—**VENEZUELA**: T. F. Amaz. Cerro de la Neblina, Basecamp 140 m, 0°50'N, 10°W, 1–9 Feb. 1985 (1 f, slide 44,335 NM), rainforest clearing near Rio Baria, 21–23 Jan. 1985 (1 m, NM). **FRENCH GUIANA**: Pied Saut, Oyapok River, Feb. 1918 (CM: 6 m, slide SJW819), March (1 m, CM); St. Laurent du Maroni (NM: 3 m, slides 44,222, 43,328 & 44,339), Sept. 1904 (1 m, NM); Mana River, May 1917 (2 m, CM); Mazaruni Potaro District, Takutu Mountains, 6°15'N, 59°5'W, 6 Dec. 1983 (1 m, NM); Mazaruni Potaro District, Dartabo Point, 22 Dec. 1983 (1 f, NM). **ECUADOR**: Zamora Chinchippe, Yanzaza 15 June 1976 (1 m, slide 44,341 NM). **PERU**: Santo Domingo, SE Peru, 6000 ft [2000 m], Nov. 1904 (1 m, slide 1532 BM); Monzon Valley, Tingo Maria, 21 Nov. 1954 (1 m, CAS); Madre de Dios, Rio Tambopata Res. 30 air km SW Puerto Maldonado, 290 m, 1–26 Nov. 1982 (1 m, CAS), 11–15 Nov. 1979 (NM: 1 m; 1 m, slide 44,224), 6–10 Nov. 1979 (1 m, NM), 16–20 Nov. 1979 (1 m, NM), 26–30 Nov. 1979 (2 m, NM); Pasco, Dept. Rio Pichanaz, 64 km SW Puerto Bermudez, 10°27'S, 75°05'W, 12 Sept. 1987

(3 m, NJ); Paco, San Juan de Cacazu, 31 km NWE Villa Rica, 10°35'S, 75°07'W, 13 Sept. 1987, 830 m (1 m, CUIC), 17 Sept. 1987 (1 m, slide SJW725 CUIC); Paco, 250 m, Iscozacín, 13 Aug. 1987, 20:00–21:30 h (1 m, CUIC). **BRAZIL**: Hyutanahan Rio Purus, Feb. 1922 (CM: 2 m, slides SJW731 & SJW826; 5 m), March 1922 (3 m, CM), Jan. 1922 (1 m, CM); St. Catherines (1 m, NM); Nova Olinda Rio Purus, May 1922 (1 m, CM), June 1922 (1 m, CM); Miracema, Rio Purus, April 1922 (5 m, CM); Rio Manes, Amazonas (1 m, NM).

Pentobesa smithsoni NEW SPECIES

Diagnosis.—This species is known only from the Dominican Republic. Both sexes have pure white hindwings, and the forewing coloration is paler than *P. sinistra* whose range overlaps. The caudal edge of the female eighth sternite is nearly smooth and the sternite is membranous midventrally (Fig. 5F). The female eighth tergal process is square (Fig. 5I). The caudal edge of the male eighth sternite is nearly straight with an abrupt, left-hand process (Fig. 5C). The distiphallus curves, and has a small left-hand process with blunt teeth encircling it (Fig. 7D). The vesica is more deeply cleft than in other species in this complex.

Description.—*Coloration*: Forewing typical for complex; hindwing of both sexes pure white. *Wingspan*: Male 39–40 mm (N = 2); female 46 mm (N = 1).

Male (Fig. 7D, 8D).—*Valve*: Costa more triangular distally, membranous area reduced, with stout setae; midplate flat. *Uncus*: Distal hood round, much smaller than other species in complex; socii with swollen bases. *Anellar region*: Costulae narrow, terminus semicircular, rounded edge serrate; juxta elongate, triangular. *Aedeagus*: As in Diagnosis.

Female (Figs. 5F, 5I, 9D).—*Eighth tergite*: Mid-dorsal process square with small lateral indentations on caudal edge; cephalic edge rounded with small mid-dorsal notch. *Eighth sternite*: Resembling *P. xylinoides*

Davis; Genitalia slide no. 44,357. National Museum of Natural History.

Paratypes.—2. **DOMINICAN REPUBLIC:** Same label data as holotype (1 m, NM); Dajabon Province, 13 km S Loma de Cabrera ca 400 m 20–22 May 1973 (1 f, slide 44,360 NM).

Pentobesa anapiesma NEW SPECIES

Diagnosis.—The coloration of the female resembles a male *P. xylinoides*. The lamellae antevaginalis is hinged with the eighth sternite and the ostium bursae appears to originate in the middle of it (Fig. 10). The female eighth sternite is large, broad and the caudal edge is unmodified (Fig. 5C). The male is unknown.

Description.—Coloration similar to *P. xylinoides*. Female wingspan 46 mm (N = 1).

Male.—Unknown.

Female (Figs. 5C, 10).—*Seventh sternite:* Caudal edge straight, but central area demelanized, appearing glandular. *Papillae anales:* Heavily melanized, setae short; posterior apophyses dorsal, short (less than 0.5 mm); band of sclerotized cuticle supporting them that broadens ventrally. *Eighth tergite:* Broad, posterior edge with slight mid-dorsal hump; constricted U-shaped groove mid-dorsum; anterior apophyses stout, short, pointed dorsally. *Eighth sternite:* Broad, caudal edge lacking setae; lamellae antevaginalis as in Diagnosis. *Ductus bursae:* Tubular, upper half partially sclerotized; ductus seminalis arising from ductus bursae near ostium bursae. *Corpus bursae:* Lacking antechamber, small, membranous with single, bifurcate, spinose signa.

Discussion.—This species is only known from Pará, Brazil.

Etymology.—The word “anapiesma” is a Greek noun in opposition and means “trapdoor.” The name refers to the unique configuration of the female lamellae antevaginalis.

Geographic range.—Pará, Brazil.

Altitudinal range.—850 m.



Fig. 10. Female genitalia of *P. anapiesma*.

but less symmetrical and both halves separated by distinct, membranous area; small lateral processes present; lamellae antevaginalis folded, edge uneven. *Ductus bursae:* Dorso-ventrally flattened, upper portion sclerotized, becoming membranous before joining corpus bursae. *Corpus bursae:* Membranous antechamber with small melanized patch on left; paired signa fused, gently rounded, spinose; ductus seminalis arising from right side of antechamber.

Etymology.—The name “smithsoni” is a noun in opposition derived from the proper name Smithson. This species is dedicated to Mr. Smithson whose generosity laid the foundation of the Smithsonian Institution.

Geographic range.—Dominican Republic.

Altitudinal range.—400–760 m.

Holotype.—Male. Dominican Republic: La Estrelleta Prov. 4 km SE Rio Limpio, ca 760 m, 24–25 May 1973, Don & Mignon

Holotype.—Female. Pará (A. M. Moss)/Rothschild Bequest 1939-1. Notodontidae genitalia slide no. 1309 f. Natural History Museum, London.

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